X

PROGRESS REPORT

OF

THE FOREST SURVEY BRANCH

FOR

1883-84:

BY

W. H. REYNOLDS, Esquire,

OFFICIATING SUPERINTENDENT OF FOREST SURVEYS.

WITH REMARKS BY THE SURVEYOR GENERAL OF INDIA,

AND

WITH THE ORDERS OF THE GOVERNMENT OF INDIA.

1885.

No. 59 F., dated Calcutta, the 21st January 1885.

From—D. FITZPATRICK, Esq., Officiating Secretary to the Government of India, Home Department.

To—The Surveyor General of India.

I AM directed to acknowledge the receipt of your letter No. 905 S., dated the 22nd October last, submitting the Annual Progress Report of the Forest Survey Department for the year ending the 30th September 1884.

2. The principal operations of the Forest Survey Branch during the year under review took place in the Melghat of Berar and in Garhwal. Minor parties were at work in South Berar, Dehra Dun, Saharanpur, and lately in the Chamba forests in the Punjab. The main body of Surveyors was employed in Berar.

The outturn of field work comprises an area of only 74 square miles plane-tabled, against 361 square miles during the previous year. On the other hand, 1,103 square miles were triangulated and 566 were traversed, besides the survey of 111 linear miles of boundaries. As the operations of the year were different from those of the previous year, in which principally plane-tabling was done, it is impossible to compare the cost of the two years' operations, but it seems clear that the outturn of work during the year under review has, on the whole, been less favourable than during the previous year. It appears that Messrs. Chill and T. S. Marten, with their parties, took the field at a somewhat late date.

3. It is satisfactory to notice that, on your inspection, you found the office in good order and the method of typing of maps and the hand-drawing in every way commendable. The Deputy Surveyor General in charge of the Trigonometrical Branch at Dehra Dun has continued to give assistance in the publication of the maps and in printing.

4. The expenditure during the survey year amounted to the following sums :—

			Rs.
Chargeable against Imperial Revenues	...	...	20,512
Ditto Berar Revenues	...	...	27,644
	Total	...	48,156

against Rs. 49,327 in the previous year.

No. 60 F.

COPY, with copy of the Report, forwarded to the Inspector General of Forests to the Government of India for information and for communication to the Superintendent of Forest Surveys.

No. 61 F.

COPY, with copy of the Report, forwarded to the Government of the North-Western Provinces and Oudh for information.

No. 62 F.

COPY, with copy of the Report, forwarded to the Revenue and Agricultural Department for information.

A. R. M.—Home Department Press—No. 23—29-1-85—240.

PROGRESS REPORT OF THE FOREST SURVEY BRANCH FOR 1883-84.

No. 905S., dated the 22nd October 1884.

From—The Surveyor General of India.

To—The Secretary to the Government of India, Home Department.

I have the honour to present to the Government of India the Annual Progress Report of the Forest Survey Branch of the Forest Department from the 1st October 1883 to the 30th September 1884, by Mr. W. H. Reynolds, the Officiating Superintendent, who has held charge of this Branch since the departure of Major F. Bailey, R.E., on furlough, on 22nd February last.

2. I find that the greater part of the field work took place in the Melghat Forest of Berar, and that Garhwal, the Dehra Dún, Saháranpúr, and the Punjab have had only comparatively small additions made to their already nearly finished maps.

3. The outturn of detail survey is considerably less than last year, or 74 square miles against 361, the year 1882-83 being one marked by an excess of detail survey on the scale of 4″=1 mile. But this is accounted for by the fact that the season was one of preparation for detail survey, and therefore an extensive series of triangulation and traversing occupied the field party in Berar. Moreover, an elaborate determination of heights, or levels, by means of the clinometer was carried on.

4. The expenditure of the season amounted to Rs. 30,940 as compared with Rs. 44,188 of the previous season. This difference in a great measure would be accounted by the smaller pay of the present Officiating Superintendent.

5. The area of final work being so small, and under all the existing conditions, there would be no great advantage in striking an average cost rate per square mile. But it may be remarked that the cost of the Jaunsar survey has reached the respectable figure of Rs. 192 per square mile, a sum comparable with the cost of similar 4″ scale forest survey in Burma, where conditions are so vastly unfavourable, which it is now estimated will be turned out at Rs. 275 per square mile.

6. In accordance with the instructions conveyed in your No. 696F., dated 28th August 1883, I have to inform you that I have lately visited the Office of the Forest Survey at Dehra, and have observed therein the same business-like management under the present Officiating Superintendent as on the occasion of my previous visit last year. I find that this Office is apt at taking advantage of the latest ideas affecting survey procedure, and this has been exemplified lately by the adaptation by Mr. Reynolds, to the purposes of his computations, of a labour saving scale, or diagram called a "traverse indicator," the original having been introduced into use in the Survey of India by myself in the year 1880 and called a "height indicator," and, as far as I have been able to judge, with the best result of economy of working combined with accuracy. The method of typing of maps and the hand drawing of this party are in every way commendable in my opinion.

7. As before, I would refer to the acknowledgment paid by the Officiating Superintendent of the assistance and co-operation afforded to his Office by the Deputy Surveyor General in charge of the Offices of the Trigonometrical Branch of the Survey of India.

Annual Progress Report of the Forest Survey Department, from the 1st October 1883 to the 30th September 1884: by Mr. W. H. REYNOLDS, *Officiating Superintendent of Forest Surveys; dated the 13th October 1884.*

THE SEASON'S FIELD WORK

Field operations during the season of 1883-84 were carried on in the Ganges Division of the Central Circle, and the Dehra Dún and Saháranpúr Divisions of the School Circle, North-Western Provinces, as well as in Berár. Orders for the survey of the Melghát Taluk in North Berár were conveyed in Government of India, Home Department (Forests) letter, No. 671 F., dated the 23rd August 1883, and the orders sanctioning the detailed survey of the Forest Reserves in South Berár were communicated in the Resident of Hyderabad's letter No. 3260, dated the 22nd December 1883.

New Surveys ordered

2. Early in November Mr. James Marten was deputed to continue the survey of the Kumaun and Garhwál Forests, which it was supposed that he, with a small party of Native Surveyors, would complete before the close of the season. He left Dehra on the 5th November, and returned to head-quarters early in June. The field work was confined to the tract on the Ganges, extending from Shisham Ghat to Lachman Jhular. An index map is attached, which shows the area topographically surveyed up to the close of season 1882-83, as well as the area surveyed during the field season of 1883-84.

Kumaun and Garhwál

3. The greater part of the establishment under Mr. Litchfield's charge left Dehra on the 10th November, and proceeded to Berár to take up the survey of the Melghát Taluk. Field work was commenced on the outer range of hills near Chikalda on the 21st November, and out-door work was continued until the end of May. Mr. Reynolds on his return from leave resumed charge of the Berár Surveys on the 8th January. Mr. Litchfield took up the triangulation of the country between Bairat and the eastern boundary of the Taluk, and Mr. Chill worked in the Gugumal Reserve and in the tract of country to the south of this reserve. Mr. T. S. Marten continued the boundary surveys of the South Berár Reserves during the early part of the season, and in February he joined the Melghát party, and was then employed on triangulating the country at the head of the Sipna Valley until the close of the season. The forest boundaries adjoining the Jamgarh, Gawalgarh and Silona Pergannahs, as well as the village boundaries in the two former Pergannahs, together with the main streams and roads, were traversed. No plane-table was attempted in the Melghát, but every endeavour was made to secure a good and ample basis for the topographical work of 1884-85 by triangulating and traversing as large a tract of country as possible in advance. At the close of the field

Berár.

season, a memorandum giving a summary of the survey work done in Berár during the season, was transmitted through the Chief Civil Officer of the province to the Resident at Hyderabad, and the Resident, in his letter, No. 1890, dated 29th July 1884, to the Commissioner of the Hyderabad Assigned Districts, expressed his "satisfaction with the rapid progress made during the last field season "in the Forest Survey of the Melghát." The index map of the Melghát, which is attached, exhibits the areas triangulated and traversed during the field season of 1883-84.

Dehra Dún and Saháranpúr Divisions.

4. A considerable length of forest block and compartment boundaries and new roads, as well as various other items, were surveyed in the Dehra Dún and Saháranpúr Divisions of the School Circle. This work kept two Native Surveyors employed for various periods between the 4th December and 17th May.

Punjáb.

5. Under instructions from the Inspector General of Forests (letter No. 90, dated 17th June 1884) two Native Surveyors were deputed to Chamba on the 16th July, for the purpose of surveying the boundaries of a number of reserves and of sketching in certain details. The work is being conducted under the local Forest Officer.

Abstract of Field work.

6. Appendix A. gives a summary of the outturn of field work and computations for the season. The area topographically surveyed with plane table on the scale of 4″=1 mile was 74 square miles as well as 111 linear miles of forest boundaries and roads. The area is distributed as follows:—in Kumaun and Garhwál 53 square miles, in South Berár 21 square miles, in the Ganges Division 18 linear miles of boundary, and in the Dehra Dún and Saháranpúr Divisions 93 linear miles of boundary and roads. The area topographically surveyed in Kumaun and Garhwál is small compared with the outturn of the previous season's work, but this is due to the fact that the survey of those tracts was approaching completion, and therefore only a very small party, sufficient to complete the survey of the Garhwál forests, could be employed upon plane-tabling. It was expected that the balance of the Kumaun and Garhwál Survey would be completed during the field season of 1883-84, but owing to the season being an unhealthy one and one of the best Native Surveyors having succumbed to cholera, it was found necessary to withdraw most of the Surveyors from the unhealthy localities, and to close the field operations earlier than usual; and hence there still remains a small area of about 24 square miles to be completed. This will be surveyed during the early part of the coming field season. The average monthly outturn of plane-tabling on the scale of 4″=1 mile, by a party of one European and four Native Surveyors in Kumaun and Garhwál, was 13 square miles as against 13·7 square miles by a party of one European and five Native Surveyors the previous season. In Berár a good start has been made with the new survey: 1,103 square miles have been triangulated giving 1,078 fixed points. The area traversed was 566 square miles, 178 square miles of which are in South Berár, and the balance is in the Melghát. Over this area 745 linear miles of traversing was run, giving 5,103 fixed stations. All forest and village boundaries that fall within the area noted, as well as all main streams and roads, were traversed. Observations with the tangent scale clinometer were taken at 80 points for the purpose of determining their heights above sea level, and the results were found to be so superior to those obtained by the Aneroid Barometer that the latter instrument will be discarded, in the future operations of the Forest Surveys, in favour of the tangent scale clinometer.

OFFICE WORK.

Computations.

7. The number of triangles computed in duplicate was 1,097, whereby 517 stations were fixed. The number of linear miles of traversing computed in duplicate was 601. The values of 80 stations of the Trigonometrical Survey were converted from spherical into rectangular co-ordinates, in duplicate. The number of triangles worked in duplicate to determine the heights of 667 points was 868. The number of barometrical observations computed in duplicate to determine the heights of 232 points was 464.

Map drawing.

8. The abstract showing the original drawings under preparation during the year will be found in Appendix B. Of the sheets reported as being in progress last year, Nos. LXXII. and LXXVII. of Kumaun and Garhwál have been published, and Nos. XLII. and L. are in the press; the drawing of sheet No. LXXIV. is completed, but the names have yet to be added. The map of the Dháragádh Forest in Jaunsár on the scale of 4″=1 mile has been published. The drawing of 12 new sheets of Kumaun and Garhwál has been taken in hand; of these Nos. LI. and LIX. are finished and have been sent to press, Nos. XV. and XX. are ready for press, the drawing of Nos. II., LXIX., LXX., LXXI., LXXIV., and LXXIX. is finished, but the names have to be added, and sheets Nos. XIX., XXXVII., and LXXIII. are still in the hands of the draughtsman. The following original drawings have also been taken in hand, viz., the Kumaun and Garhwál chart of triangulation, sheets Nos. II., V., and VI. on the scale of 1″ = 1 mile (the drawing is finished, but the names are to be added); an index chart of the field sheets of the Kumaun and Garhwál Survey, scale 1″= 4 miles, is in progress; a map of the Dadi and Raiengarh leased forests, including the forest of Chachpur, on the scale of 2″= 1 mile, is in the press; a map in two sheets of the forests of Lambatach, Deota, &c., on the scale of 4″=1 mile (the Western sheet is nearly ready for press, and the drawing of the Eastern sheet is in progress); a map on the scale of 1″=4 miles of the Debra Dún Division to illustrate reports, &c., is in the press; a revised index map on the scale of 8 miles = 1″ showing the arrangement and numbers of the sheets of the Melghát Survey is in the press; a map of the Ellichpur Taluk in Berár, on the scale of 1″=1 mile, showing the classification of District forests is in progress; a sketch map of the Gangotri Forest in Tiri-Garhwál on the scale of 1″=1 mile to illustrate a report has been published; a geological map of Mussoorie and Landour on the scale of 1″=1 mile, has passed through the press; and a traverse indicator or a diagram for taking out traverses by inspection instead of computing them has been published.

Miscellaneous work.

9. Seventy-six tracings from maps were prepared and supplied to various District and Forest Officers, 655 printed maps were coloured, and 357 printed maps were cut up and mounted in book-form. The areas of 81 compartments in the Bhira Sub-Division in Oudh, on two of the Revenue survey sheets, were calculated. The record of forest growth has been added to 16 sheets of the Kumaun and Garhwál Survey. The alterations and additions to the list of available maps of the reserved forests in the various provinces under the Government of India have been made as far as possible, and the alterations of boundaries are being posted up on the maps.

Maps for the Edinburgh Forestry Exhibition.

10. A set of 100 maps of various sorts and scales, showing forest tracts, was selected for the Edinburgh Forestry Exhibition from the stock of maps in the Superintendent's Office. These maps

were despatched to the Secretary of the International Forestry Exhibition on the 11th February. A list of the maps and a short note about each is given in the Government of India "List of publications "and maps relating to Forest Administration in India sent to the "Edinburgh International Forestry Exhibition of 1884."

INSTRUCTION OF STUDENTS OF THE FOREST SCHOOL.

11. Of the 19 students previously reported as being under instruction in surveying, 15 have received certificates of qualification by the lower standard as laid down in paragraph 50 of the Forest Department Code, and 20 new students are now under instruction. The new men have been taught (during the recess whilst the rains prevented out-of-door work) all branches of the work that can be done in-doors, such as plane drawing, shading of diagrams, printing by hand, reduction and enlargement of maps, construction of scales, calculation of areas, plotting from field books, use of mathematical and drawing instruments, &c., &c.; and during the coming field season the students will spend two months with the Garhwál field party, and will be taught the practical part of the work. This arrangement is found to answer very much better than the old one of attempting to teach the whole course during the Forest School sessions or during the rainy months of the year, when out-of-door work is more or less impracticable.

USE OF THE TANGENT SCALE CLINOMETER AND TRAVERSE INDICATOR.

Tangent scale clinometer.

12. The tangent scale clinometer has been used experimentally in Garhwál, during the season under report, for determining the heights of points above sea level, and it has been found to give such satisfactory results, and is so peculiarly adapted to forest survey purposes that it will, in the future operations of the department, be substituted for the Aneroid Barometer. In Berár some experimental surveys were made with a view to adopting, for forest maps, the system of measured contour lines at fixed vertical intervals. The tangent scale clinometer was used for determining the position of the contours, and also for following out the horizontal lines of contour on the ground. The result was in every way a success. A memorandum on the subject, by the Officiating Superintendent of Forest Surveys, was submitted to the Inspector General of Forests early in May, with a suggestion that, in the survey of the Melghát, measured contours should be laid down at every 300 feet vertical, and that in the South Berár Forest Surveys the contours be measured at every 200 feet vertical. The system has been approved, and the work will be carried out accordingly.

Traverse indicator.

13. Another feature has been introduced into the working of the Forest Surveys, whereby a considerable saving in time and labour has been effected in the computation of traverses. Hitherto all the traversing has been computed with the aid of bulky traverse tables, but the Officiating Superintendent has now designed a convenient diagram from which the traverses can be taken out by simple inspection, and the traverse tables be entirely dispensed with. The diagram will also be used in connection with the tangent scale clinometer for determining the position in the field of contour lines at fixed vertical intervals. A copy of the diagram or "Traverse indicator" is appended to this Report.

EXPENDITURE.

Imperial

14. In Appendix C will be found the amounts expended on field and office work in Kumaun and Garhwál, in Jaunsár, in Dehra Dún and Sahárunpúr, and in the Bhagirathi Valley Surveys, as well as charges for work not connected with these surveys. In Kumaun and Garhwál the cost of the field work was Rs. 4,139 and of the office work Rs. 4,145. The sum of Rs. 1,055 was expended on the Jaunsár Surveys, chiefly in preparing fair maps for the press, which have hitherto been held in abeyance. In Dehra Dún and Sahárunpúr Rs. 256 were expended on linear surveys, and in the Bhagirathi Valley the cost of the field work was Rs 537, and that of the office work Rs. 100. The total expenditure for the year including all charges was Rs. 20,512. The small survey party that was employed in Kumaun and Garhwál is the only one against which a plane-tabled area can be shewn. The bulk of the establishment was employed upon work other than plane-tabling, and hence it would be misleading to deduce, on the lines of the previous report, an *average* figure of cost per square mile of the North-West Provinces Surveys based upon the area plane-tabled by the Kumaun and Garhwál party. The cost of the Kumaun and Garhwál field work per square mile was Rs. 78, as against an average of Rs. 88 for the same survey for the past three years.

Berár.

15. In South Berár the cost of the boundary surveys was Rs. 2,344, which was defrayed from local forest funds. In the Melghát the cost of the field work was Rs. 8,421, and that of office work Rs 1,262, and including all miscellaneous charges the total expenditure for the year was Rs. 27,644. The cost of triangulating 1,103 square miles of the Melghát and of measuring 589 linear miles of traversing over an area of 388 square miles was Rs. 9,683, which charge also includes the cost of the whole of the computations enumerated in Appendix A. No plane-tabling was done, and hence the cost of the work per square mile estimated upon this branch of the work cannot be given. But if the cost of the triangulation, traversing and computations be estimated upon the area triangulated, the result is Rs. 9 per square mile. As soon as the topographical survey has sufficiently advanced, the cost of the work per square mile will be based as usual upon the area plane-tabled.

Final cost of Forest Survey work.

16. The Kumaun and Garhwál Survey up to the 30th September 1883, including all charges, cost an average of Rs. 112 per square mile, and if to this is added the subsequent outturn, and the charges for the year under report, the cost to date (30th September 1884) is Rs. 113 per square mile. The cost of the Jaunsár and Tons Surveys was last year reported at Rs. 186 per square mile. To this figure must now be added the cost, during the year, of mapping of the Dadi and Raiengarh Forests, as well as that of Lambatách, and this will bring the average cost of the work, up to date, including all charges, to Rs. 192 per square mile. The cost of the Bhagirathi Valley Survey, after adding the charges for the year under report, stands at Rs. 127 per square mile. The cost of the Jaunsár and Tons Surveys is high, but the reason for this has already been explained in the Report for 1882-83.

OFFICERS OF THE SUPERIOR STAFF.

Mr. W H Reynolds, Officiating Superintendent of Forest Surveys.

17. Mr. W. H. Reynolds, Deputy Superintendent of Forest Surveys, on return from furlough took over charge of his office at Ellichpur in Berár, on the 8th January. He was appointed to

officiate as Superintendent of Forest Surveys, in addition to his duties as Deputy Superintendent, from the 22nd February, the date on which Major F. Bailey, R.E., availed himself of 18 months' furlough. He was in Berár from January to June conducting the surveys of that province, and he also directed the field operations of the several detached parties that were working in the North-Western Provinces. He returned to the Head-quarters Office at Dehra Dún on the 30th June.

Mr. E. F. Litchfield, Assistant Conservator of Forests.

18. Mr. Litchfield was employed from the 21st November to the 1st May on triangulating the south-eastern portion of the Melghát. He then returned to Chikalda, which has been constituted the head-quarters of the Berár Survey. During the recess season he has been employed in drawing the fair sheets of the Lambatách Forests. Mr. Litchfield is an excellent draughtsman, and his drawings of the Lambatách sheets have been neatly executed. He held charge of the office of Deputy Superintendent up to the 8th January whilst Mr. Reynolds was on leave.

FOREST SURVEYORS.

Mr. G. P. Chill.

19. Mr. Chill left Dehra for Berár on the 17th November. He arrived at Ellichpur on the 21st, and on the 10th December he commenced his field work. He was employed throughout the field season upon triangulation in the Melghát. He suffered a good deal from fever towards the end of the season, and was brought into Chikalda on the 15th April seriously ill, and he was unable to take the field again.

Mr. T. S. Marten.

20. Mr. T. S. Marten left Dehra for Berar on the 12th November, but owing to some mismanagement in the transit of his things, he did not begin his field work until the 11th December. He was employed up to the end of January in surveying the boundaries of the reserved forests in South Berár, and on the 10th February he joined the main survey party in the Melghát. He was employed upon triangulating the Sipna Valley up to the 7th May, and he then returned to Chikalda. During the recess Mr. Marten has been employed upon drawing some of the fair sheets of Kumaun and Garhwál, and his drawing both in quantity and quality is very satisfactory. He was on privilege leave from the 9th June to the 9th July.

Mr. James Marten.

21. Mr. James Marten with a small party of Native Surveyors left Dehra on the 5th November, and marched to Garhwál to complete the survey of the forests on the Ganges. He was in the field from the middle of November to the end of May, and returned to Dehra on the 2nd of June. His return of plane-tabling for April was under the average outturn of work, and in May a very nominal area was returned. This is accounted for chiefly from the fact that, during the last two months of the field season, although Mr. Marten himself worked hard, the Native establishment with him were more or less disabled by sickness, and at a time when he could not be replaced, one of the best Native surveyors of his party died of cholera. Had the season not been such an unhealthy one, Mr. Marten would have completed the survey of the Garhwál Forests. Mr. Marten was on privilege leave from the 3rd July to the 17th September.

SUB-SURVEYORS

22. The average monthly strength of the Native establishment employed during the field season on each kind of work was—

Triangulation	...		...	... 1
Traversing	...	...	...	... 4
Plotting boards	...	...	...	... 1
Computing	...	...	..	... 4
Plane-tabling	...	...	...	... 6
		Total in the field		.. 16
		At head-quarters		.. 7
		Total		.. 23

The Native establishment has worked willingly and well, often under very trying circumstances, in the unhealthy tracts of the Melghát. Several of the Sub-Surveyors have very much improved in their style of drawing, and one has become expert in triangulation.

Health of the establishment

23. Owing to the heavy rains in February, the Melghát was very unhealthy, and consequently the Berár establishment, both European and Native, suffered a good deal from fever. The Garhwál party also suffered very much from fever, and one of the best of the Sub-Surveyors (Puran Sing) succumbed to cholera.

WORK DONE BY THE SURVEY OF INDIA FOR THE FOREST SURVEY.

24. The maps of the Forest Survey continue to be photo-zincographed at the Office of the Trigonometrical Branch of the Survey of India, and much work in the way of miscellaneous printing, &c., has been done by that Office. All the work executed has been done promptly and in a most satisfactory manner, and the Forest Survey continues to derive much advantage from its intimate connection with the Survey of India.

25. The following documents are appended to this Report :—

(1.) Chart illustrating progress of the Kumaun and Garhwál work.

(2.) Chart illustrating progress of the Melghát work.

(3.) Traverse indicator.

(4.) Appendix A—Summary of outturn of Field work and Computations.

(5.) Appendix B—Summary of outturn of Drawing and Miscellaneous work.

(6.) Appendix C—Summary of Imperial expenditure from 1st October 1883 to 30th September 1884, showing the amounts expended on Field and Office work.

(7.) Appendix D—Summary of expenditure on Berar Surveys from 1st December 1883 to 30th September 1884, shewing the amounts expended on Field and Office work.

(8.) Annual From No. 53—Summary of Revenue and Expenditure during the financial year.

(9.) Annual Form No. 54—Account current.

(10.) Annual Form No. 55—Statement of Outstandings and Liabilities.

(11.) Annual Form No. 56—Revenue received and outstandings on account of Revenue.

APPENDICES.

APPENDIX A.

Summary of the outturn of Field Work and Computations by the Forest Survey Department from 1st October 1883 to 30th September 1884.

No.	Kumaun, Garhwál, Bhagirathi and Berár Surveys.		Amount.	Remarks.
	Plane-tabling.			
1	Area plane-tabled on the scale of 4″ = 1 mile—			
	(*a*) Kumaun and Garhwál	53	74	Square miles.
	(*b*) South Berár Forest boundaries with a strip of topography, 5 chains on either side	21		
	(*c*) Ganges Division Forest boundaries		18¼	Linear miles.
	(*d*) Dehra Dún and Saháranpúr ditto		93	Ditto.
	Triangulation.			
2	Area triangulated—			
	Melghát		1,103	Square miles.
3	Number of points fixed		1,078	
	Traversing.			
4	Area traversed—			
	(*a*) Melghát	388	566	Square miles.
	(*b*) South Berár	178		
5	Number of linear miles traversed—			
	(*a*) Melghát	589	745	
	(*b*) South Berár	156		
6	Number of traverse stations		5,103	
	Computations.			
7	Number of linear miles of traversing in duplicate—			
	(*a*) Melghát	456	601	
	(*b*) South Berár	145		
8	Number of triangles worked in duplicate—			
	(*a*) Kumaun and Garhwál	90	1,097	
	(*b*) Melghát	1,007		
9	Ditto of points fixed thereby—			
	(*a*) Kumaun and Garhwál	41	517	
	(*b*) Melghát	476		

No.	Kumaun, Garhwál, Bhagirathi and Berár Surveys.	Amount.	Remarks
	Computations—continued.		
10	Number of Great Trigonometrical Survey stations computed in duplicate—		
	(*a*) Melghát 70	80	
	(*b*) Bhagirathi 10		
11	Ditto of triangles worked in duplicate to determine heights—		
	(*a*) Kumaun and Garhwál 61	868	
	(*b*) Melghát 807		
12	Number of points of which the heights were determined thereby—		
	(*a*) Kumaun and Garhwál 250	667	
	(*b*) Melghát 417		
13	Ditto of barometrical observations—		
	Kumaun and Garhwál	464	
14	Ditto of heights determined by Tangent Scale Clinometer	80	

APPENDIX B.

Summary of Outturn of Drawing and Miscellaneous Work executed by the Forest Survey Department from 1st October 1883 to 30th September 1884

No	Particulars	Number of sheets	Remarks
	Original drawings.		
1	Kumaun and Garhwál Sheets, scale 4″=1 mile (in progress), Nos II, XV, XIX, XX, XXXVII, LI, LIX, LXIX, LXX, LXXI LXXIV, and LXXIX. (Nos LI and LIX sent to press)	12	
2	Chart of Kumaun and Garhwál Triangulation, Nos. II, V., and VI, scale 1″=1 mile (in progress)	3	
3	Index Chart of field sheets of Kumaun and Garhwál survey, scale 1′=½ miles (in progress)	1	
4	Map of Dadi and Raiengarh leased forests, including the forest of Chachpur, scale 2″=1 mile (sent to press)	1	
5	Maps of Lambatách and Deota forests, scale 4″=1 mile (in progress).	2	
6	Map of the Dehra Dún Division, scale 1″=4 miles (sent to press)	1	
7	Index map of Berár, scale 1″=8 miles (sent to press) ...	1	
8	Map of Ellichpur Taluk, scale 1″=1 mile, showing classification of District forests (in progress)	1	
9	Map of the Gangotri Deodar forests, Tiri Garhwál, scale 1″=1 mile (published).	1	
10	Geological map of the Mussoorie Municipality with Landour and Rajpur, North-Western Provinces, scale 1″=1 mile (published).	1	
11	Traverse indicator (published)	1	
	Tracings made.		
12	Tracings made for various Forest and District Officers ..	76	
	Maps coloured.		
13	Printed maps of various kinds, coloured	655	
	Mounted maps.		
14	Printed maps mounted in book form	357	
	Area of forests measured		
15	Area measured of 81 compartments from 1″=1 mile map of the Kheri District, Bhira Sub-division, Oudh.	2	
	Record of Forest growth		
16	Kumaun and Garhwál, Sheets Nos XXXVI, XXXVIII, XLV, XLIX., LXV, LXVI, LXXII and LXXVIII	8	In duplicate.

APPENDIX C.

Summary of Expenditure from 1st October 1883 to 30th September 1884, showing the amounts expended on Field and Office Work of the Forest Surveys (Imperial).

No.	Months	Kumaun and Garhwal		Jaunsar.		Bhagirathi.		Dehra Dun and Saharanpur	General.	Total.
		Field	Office.	Field.	Office	Field	Office			
		Rs	Rs.	Rs.	Rs.	Rs	Rs	Rs	Rs	Rs.
1	October 1883 ...	...	230	...	100	527	50	...	1,627	2,534
2	November „ ...	...	494	..	50	...	50	...	2,740	3,334
3	December „ ...	634	239	...	...	10	...	...	512	1,395
4	January 1884 ...	605	70	...	...	...	...	28	349	1,052
5	February „ ...	562	20	...	...	...	...	50	397	1,029
6	March „ ...	551	47	...	...	...	...	55	404	1,057
7	April „ ...	7	186	...	...	...	...	74	421	688
8	May „ ...	1,144	149	...	5	...	...	36	494	1,828
9	June „ ...	594	611	...	...	...	...	13	485	1,703
10	July „ ...	42	485	...	255	...	...	...	1,033	1,815
11	August „ ...	...	714	...	343	...	...	...	814	1,871
12	September „ ...	...	900	.	302	...	...	...	1,004	2,206
	Total ...	4,139	4,145	...	1,055	537	100	256	10,280	20,512

APPENDIX D.

Summary of Expenditure from 1st December 1883 to 30th September 1884, showing the amounts expended on Field and Office Work of the Melghát Survey.

No	Month	Field	Office.	General.	Total	Remarks
		Rs	Rs	Rs.	Rs.	
1	December 1883 ...	169	...	1,945	2,114	The Melghát Survey was commenced in November 1883.
2	January 1884 ...	718	...	1,829	2,547	
3	February „ ...	2,000	...	4,358	6,358	
4	March „ ...	2,124	..	1,900	4,024	
5	April „ ...	1,734	234	1,492	3,460	
6	May „ ...	1,531	184	1,243	2,958	
7	June „ ..	145	154	1,984	2,283	
8	July „ ...	...	371	1,198	1,569	
9	August „ ...	...	150	1,300	1,450	
10	September „ ...	...	169	712	881	
	Total ...	8,421	1,262	17,961	27,644	

ANNUAL FORM No. 53 [*Prescribed*].

Summary of Revenue and Expenditure of the Forest Survey Branch during 1883-84.

Budget Heads	Direction
Receipts.	Rs As P
I.—Timber and other Produce removed from the Forests by Government Agency :—	
a Timber	...
b Firewood and Charcoal	...
c Bamboos	...
d Sandal-wood	...
e. Grass and other Minor Produce	...
II.—Timber and other Produce removed from the Forests by Consumers or Purchasers :—	
a Timber	...
b Firewood and Charcoal	...
c Bamboos	...
d Grazing and Fodder Grass	...
e Other Minor Produce	...
III—Confiscated Drift and Waif Wood	...
IV.—Revenue from Forests not managed by Government :—	
a Duty on Foreign Timber and other Forest Produce ...	...
b. Revenue from Shared and Private Forests	...
V—Miscellaneous :—	
a. Fines and Forfeitures	...
b. Refunds	...
c. Other Sources	35 8 0
Total Receipts ...	35 8 0
Expenditure.	
A—Conservancy and Works.	
I.—Timber and other Produce removed from the Forests by Government Agency :—	
a. Timber	...
b Firewood and Charcoal	...
c Bamboos	...
d Sandal-wood	...
e. Grass and other Minor Produce	...
II—Timber and other Produce removed from the Forests by Consumers or Purchasers	...
III—Confiscated Drift and Waif Wood	...
IV.—Revenue from Forests not managed by Government :—	
a Duty on Foreign Timber and other Forest Produce ...	...
b. Revenue from Shared and Private Forests	...
V.—Rent of leased Forests, and Payments to Shareholders in Forests managed by Government	...
VI—Live Stock, Stores, Tools and Plant :—	
a. Purchase of Cattle	...
b Feed and keep of Cattle	1,436 12 7
c. Stores, Tools and Plant	751 8 0
VII—Communications and Buildings :—	
a. Roads and Bridges	...
b Buildings	...
c. Other Works	...
VIII—Demarcation, Improvement and Extension of Forests :—	
a Demarcation	...
b Compensation for Land and Rights	...
c Surveys and Working Plans	5,263 8 4
d. Plantations	...
e. Protection from Fire	...
f Other Works	...
Carried over ...	7,451 12 11

ANNUAL FORM No. 53 [*Prescribed*]—concld.

Summary of Revenue and Expenditure of the Forest Survey Branch during 1883-84.

Budget Heads.	Direction.
	Rs. As. P.
A.—Conservancy and Works—*concld.*	
Brought forward ...	7,451 12 11
IX.—Miscellaneous :—	
a. Refunds	.....
b. Law Charges	.....
c. Other Charges	.....
Total A.—Conservancy and Works ...	7,451 12 11
B.—Establishments.	
I.—Salaries :—	
a. Conservators	.....
b. Superior Officers	7,410 5 4
c. Subordinate Forest and Depôt Establishments	11,947 11 1
d. Office Establishments	.....
e. Deputation and Special Allowances	41 5 4
II.—Travelling Allowances :—	
a. Conservators	.....
b. Superior Officers	970 8 0
c. Subordinate Forest and Depôt Establishments	2,069 5 7
d. Office Establishments	.....
III.—Contingencies :—	
a. Stationery	2 4 0
b. Carriage of Tents and Records	260 10 7
c. Rents, Rates and Taxes	.....
d. Pay of Police Guards	.....
e. Official Postage	202 15 6
f. Sundries	583 2 10
Total B.—Establishments ...	23,488 4 3
Grand Total of Expenditure ...	30,940 1 2

ANNUAL FORM No. 54 [*Prescribed*].

Account Current of the Forest Survey Branch for the year 1883-84.

Dr. Cr.

	Rs. As. P.		Rs. As. P.	Rs. As. P.
To Cash Balance	321 8 7	By Expenditure as per Annual Summary	.....	30,940 1 2
„ Revenue as per details in the Annual Summary	35 8 0	„ Advances Recoverable ...	.....	17,653 15 8
Service Funds.		Inter-Departmental Transfers.		
„ Uncovenanted Service Family Pension Fund, Bengal	733 13 0	„ Value of articles returned to the Mathematical Instrument Department ...	.....	23 8 0
Forest Cash Remittances (Local).		Berar Suspense Account.		
„ Remittance from State Treasuries ...	19 9 6	„ Remittance to Ellichpur Treasury	12 0 0	
„ Advances Recoverable	15,295 8 8	„ Expenditure incurred for survey of the Melghât Taluk in Berar ...	15,043 1 1	
„ Suspense Account	23 0 2			15,055 1 1
„ Government, North-Western Provinces and Oudh	35,011 9 1	„ Cash Balance ...	.....	459 15 0
Inter-Departmental Transfers.				
Civil Department.				
„ Mathematical Instrument Department	1,097 4 0			
Berar Suspense Account.				
„ Remittance from Ellichpur Treasury, Berar	11,594 11 11			
Total ...	64,132 8 11	Total ...	.....	64,132 8 11

ANNUAL FORM No. 55 [*Prescribed.*]

Forest Survey Branch Statement of Outstandings and Liabilities on account of Contractors and Disbursers for 1883-84.

Division.	Department Debtor.			Department Creditor.			Balance due.	
	At commencement of year.	Recoveries in cash and value of supplies and work done during the year.	At close of year.	At commencement of year.	Payments made during year.	At close of year.	To Department (Outstandings).	By Department (Liabilities).
		Rs. As. P.	Rs. As. P.	Rs. As. P.	Rs. As. P.	Rs. As. P.	Rs. As. P.	Rs. As. P.
Forest Surveys ...	...	15,295 8 8	15,295 8 8	205 0 0	17,653 15 8	17,858 15 8	2,713 7 0	150 0 0
Total ...	...	15,295 8 8	15,295 8 8	205 0 0	17,653 15 8	17,858 15 8	2,713 7 0	150 0 0

ANNUAL FORM No. 56 [*Prescribed*].

Forest Survey Branch Statement of Revenue received and Outstandings on account of Revenue during 1883-84.

Division.	Particulars.	Outstandings at commencement of year.	Value of sales and other revenue during year.	Total.	Amount realised during year.	Balance due to the Department at end of year.
			Rs. As. P.	Rs. As. P.	Rs. As. P.	
Survey Branch ...	Miscellaneous Revenue ...	.....	35 8 0	35 8 0	35 8 0	.....
	Total ...	.....	35 8 0	35 8 0	35 8 0	.....

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